Oct. 9, 1923. 1,470,093

G. MODIGLIANI

MAGNETO ELECTRIC MACHINE

Filed Dec. 23, 1919

FIG. 1.

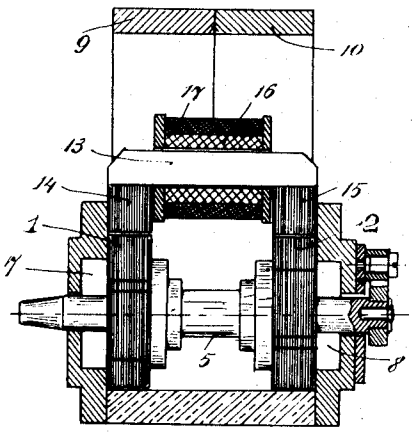


FIG. 2.

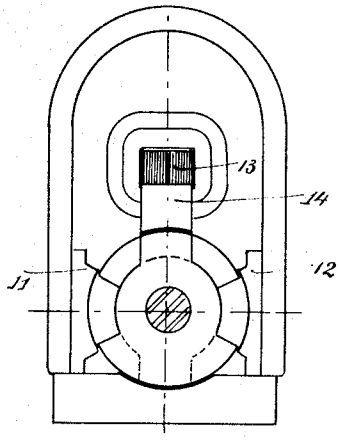


FIG. 3.

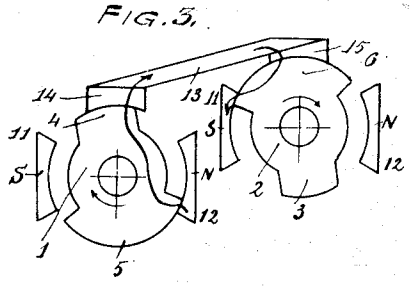


FIG. 4.

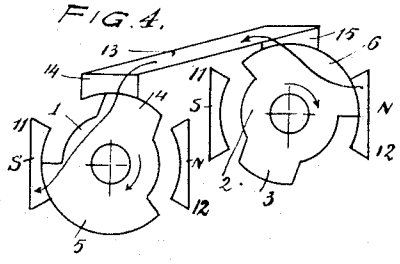


FIG. 5.

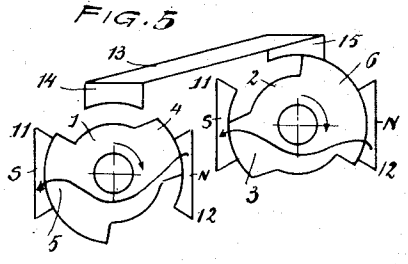
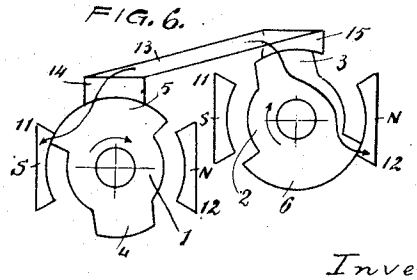


FIG. 6.



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UNITED STATES PATENT OFFICE.

GINO MODIGLIANI, OF IVREA, ITALY, ASSIGNOR TO ING. CAMILLO OLIVETTI & C., OF IVREA, ITALY, A FIRM.

MAGNETO-ELECTRIC MACHINE.

Application filed December 23, 1919. Serial No. 346,828.

To all whom it may concern:

Be it known that I, GINO MODIGLIANI, subject of the King of Italy, residing at Ivrea, Kingdom of Italy, have invented certain new and useful Improvements in Magneto-Electric Machines, of which the following is a specification.

The magneto-electric machine which forms the object of the present invention belongs to the class of machines generally termed "magnetos" which may be utilized for generating electric currents for many and different purposes, but particularly for producing sparks in the sparking plugs of internal combustion engines.

The machine in question is of the type embodying fixed magnets and induction coil, and the oscillations and reversals of the magnetic flux in the core of the induction coil are obtained by means of the rotation of a body composed of magnetic pieces or elements which connect magnetically as well as alternately each terminal of the core of the induction coil with the pole pieces of the permanent magnets. This type of machine has the advantage that the rotor is of simple and strong construction, in order to allow the high speed of rotation required by modern explosion motors to be attained without the least danger. Moreover, since all of the electrical connections are fixed, the machine does not necessitate any rubbing contact whatever, and thus affords great certainty of operation.

A structural embodiment of the invention is represented in the accompanying drawings; but no limitation to the specific details thereof is contemplated, as the disclosure in question is given merely by way of example.

In the drawings accompanying this specification:

Figure 1 is a cross-section of the machine,

Fig. 2 is an end view thereof, and

Figs. 3, 4, 5 and 6 represent diagrammatically the rotor in its various positions.

Corresponding parts and features are designated by the same reference characters throughout the several views.

As shown clearly in the accompanying drawings, the rotor comprises two rings 1 and 2. The two rings are constructed of magnetic material and are fastened by means of screws, or in some other suitable manner to a shaft 5. These rings may be made, in part at least, of soft laminated iron, whereas the shaft 5 is of non-magnetic material.

This assemblage of parts rotates in two bearing blocks 7 and 8, between the pole pieces 11 and 12 of two permanent horseshoe magnets 9 and 10. The pole pieces, which are of cast iron or other magnetic material, have the form shown in the drawing.

The core 13 of the induction coil carries the windings of the magneto, and is extended at opposite ends to form two depending parts 14 and 15, the lower ends of which embrace the rings 1 and 2, from which they are separated only by a slight air gap. Accordingly, the ring or annular part 1 forms a magnetic extension of the part 14, and the ring 2 a magnetic extension of the part 15. Around the core 13 are wound two windings 16 and 17 of which the winding 16 of heavy wire is limited to a comparatively small number of turns and forms the low tension winding, while the winding 17, which is laid in series upon the first winding and is composed of a large number of turns of fine wire, forms the high tension winding. The purpose and operation of the windings being obvious it is deemed unessential to describe them further.

The pole pieces of the magnets form a cylindrical cavity extending the whole length of the machine and the rotating part is formed of two rings 1 and 2 of magnetic material, which may be laminated, and balanced as shown in the drawings. These rings are fixed at an angle of 180° to one another upon the shaft of the machine, and they have gaps in their peripheries which make them roughly T-shaped in end elevation.

Examination of the diagrams in Figs. 3 to 6 will give a clear understanding of the working of the magneto. The rotating part constitutes a pole piece of the core of the induction coil, which moves in the space between the pole pieces 11 and 12, but maintains contact with the core of the induction coil only during the period in which variations and reversals of the lines of magnetic flux are occurring.

Supposing that the outer lines of magnetic induction of the magnet are coming from the North or positive pole to the South or negative pole and that the pole piece 12 of ring 1 is in connection with the North or positive pole when the rotating part is in

the position shown in Fig. 3, the lines of magnetic induction issuing from the pole piece 12 traverse the ring and enter the core 13 by the end 14, issuing by the end 15 to join the pole piece 11 across the part of the ring 2.

If the rotating part is rotated through a certain angle in the direction of the arrow (Fig. 4) part 4 of the ring 1 still remains in magnetic connection with the end 14 of the core, but the part 5 leaves the pole piece 12 and comes opposite the pole piece 11. The ring 2 still continues with its part 6 opposite the end 15 of the core 13 but it leaves the pole piece 11 to come in contact with the pole piece 12. The lines of magnetic induction in the core are thus reversed, entering now by the end 15 to issue from it by the end 14.

If the rotation is continued the part 4 of the ring 1 leaves the end 14 of the core and comes opposite the pole piece 12 and the part 6 of the ring 2 leaves the end 15 of the core while the opposite side comes opposite the pole piece 11. The magnetic circuit is thus closed directly through the rotating part.

If the rotation is continued a position is reached which is symmetrical with the starting position, as shown in Fig. 6 with the flux reversed through the core.

It should be pointed out that the ends 14 and 15 of the core, when the rotating part turns in contact with them, re-acquire the same polarity as they had when the rotating part left them. Thus from a study of Fig. 4 it will be seen that the end 14 is in magnetic communication with the pole piece 11, while it is about to be left by the part 14 of the ring 1, and it returns into communication with the same pole piece 11 when the rotating part returns opposite it with its end 5 (Fig. 6). The same result follows with the other end 15 of the core (Figs. 5 and 6).

Thus all the reversals and variations of the magnetic flux in the core occur in this case as in the first case described, that is to say when its ends are connected magnetically with the rotating part.

I claim as my invention:

1. A magneto-electric machine, comprising a fixed permanent magnet; a fixed induction coil having a core provided with down-turned ends; and a rotor embodying two annular parts turning in the space between the opposite pole pieces of the magnet, said annular parts having gaps in their peripheries which make them roughly T-shaped in end elevation.

2. A magneto-electric machine, comprising a fixed permanent magnet; a fixed induction coil having a core provided with down-turned ends; and a rotor embodying two rotating parts which are roughly T-shaped in end elevation and turn about a common axis in the space between the opposite pole pieces of the magnet, said down-turned core ends adapted to contact magnetically with the peripheries of said rotating parts so as to close the magnetic circuit of the permanent magnet four times during one revolution of the rotor and remain in magnetic communication with one extremity of the core during the period when the variations and reversals of the magnetic flux are taking place in said core.

3. A magneto-electric machine having a fixed permanent magnet and a fixed induction coil in which the current is generated by the variation of the number of lines of magnetic induction and their reversal in the core of the induction coil, variations and reversals being determined by the movement of two parts rotating in a space formed by the pole pieces of the permanent magnet in which each rotating part communicates to the corresponding end of the core of the induction coil, at the moment when it comes into magnetic communication therewith, the same polarity which it was conveying at the moment it became detached.

In testimony whereof I affix my signature.

ING. GINO MODIGLIANI.